

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Patent Application of:	Frank FILSER et al.	Before the Board of Appeals
Application No.:	09/623,268	Confirmation No.: 1826
Filed:	August 30, 2000	Art Unit: 1791
For:	DENTAL CROWNS AND/OR DENTAL BRIDGES	Examiner: J. LAZORCIK

REPLY BRIEF

MS APPEAL BRIEF-PATENTS

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

The present Reply Brief is submitted in response to the Examiner's Answer dated April 13, 2010. This Reply Brief is in compliance with M.P.E.P. § 1208 and 37 C.F.R. § 41.41 and being timely filed.

For clarity, some of the issues presented in the Appeal Brief filed January 19, 2010, will be repeated first, followed by Appellants' arguments to the Examiner's Answer.

I. STATUS OF CLAIMS

A. Total Number of Claims in Application

There are 22 claims pending in the application.

B. Current Status of Claims

1. Claims canceled: 1-15 and 35-40.
2. Claims withdrawn from consideration but not canceled: none.
3. Claims pending: 16-34 and 41-46.
4. Claims allowed: none.
5. Claims rejected: 16-34 and 41-46.

C. Claims On Appeal

The claims on appeal are still claims 16-34 and 41-46.

II. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Claims 16-34 and 41-46 are pending. The grounds of rejection to be reviewed on appeal are still the following three:

1) Whether or not claims 16-34, 41-43 and 45 under 35 U.S.C. § 103(a) are patentable over **Wohlwend** (U.S. Patent No. 6,106,747) in view of Appellants' previous Exhibit A of a John **Halloran** letter dated April 6, 2004 (see Final Office Action (hereinafter referred to as "**Final OA**"), paragraphs 1-2 at pages 3-9; hereinafter "**Rejection (1)**").

2) Whether or not claim 44 under 35 U.S.C. § 103(a) is patentable over **Wohlwend** in view of **Halloran** as applied to claim 1 above in further view of **Guiot et al.** (U.S. Patent No. 6,287,121) (Final OA, paragraph 3 at pages 9-11; hereinafter "**Rejection (2)**").

3) Whether or not claim 46 under 35 U.S.C. § 103(a) is patentable over **Wohlwend** in view of **Halloran** as applied to claim 1 above in further view of **Glass et al.** (Conference Proceedings -1995) (Final OA, paragraph 4 at pages 11-13; hereinafter "**Rejection (3)**").

III. ARGUMENTS

The claimed invention is explained extensively in the previously filed Appeal Brief (of January 19, 2010). Appellants recap some features of the present invention as they relate to the present Reply Brief. Then, Appellants address the points made by the Examiner in the Examiner's Answer (hereinafter "Answer").

An enlargement factor (**f**) is recited in each of independent claims 16, 32, 33, 44, 45 and 46 (and thus of course is recited in the dependent claims), which is as follows:

$$f = \sqrt[3]{\frac{\rho_s}{\rho_R}}$$

The above enlargement factor (**f**) is derived from the relative density ρ_R of the preproduced blank and the achievable relative density ρ_s after sintering according to the above equation.

With the presently claimed processes, the dimensions of the surface of the skeletal structure model are enlarged linearly (by enlargement factor (**f**)) in all directions to compensate for shrinkage upon sintering. And by utilizing the claimed enlargement factor (**f**), the present invention provides advantages that include requiring no further work since the claimed process makes a tooth crown and/or bridge having a perfect fit even with a filigree form (see paragraph [0005]), and yielding a simple, safe method at a low cost.

The Examiner has issued the Answer on April 13, 2010. Appellants respond to the arguments set forth on pages 13-23 of the Answer. Appellants note that the arguments below are applicable to all three appealed rejections, as the Examiner has responded to all three rejections at the same time in the Answer as well.

Response to Argument #1)

In the Answer starting at page 13 of section “(10) Response to Argument”, the Examiner has set forth “Argument #1)”, which is a response to Appellants’ previous argument(s). Here, the Examiner largely dismisses Appellants’ claimed invention stating that the enlargement factor (**f**) is not a distinctive, patentable feature. More specifically, wherein Appellants pointed out how Wohlend is directed to a “one size fits all” enlargement factor for a given material and a given presintering temperature, the Examiner is of the opinion that the Wohlwend disclosure would contemplate tailoring enlargement factors to specific material properties as well as to the handling history of the blank, thereby advising against a “one size fits all” enlargement factor (Answer, page 14, last paragraph). Appellants respectfully submit to the honorable Board that the Examiner’s interpretation is not correct, the Examiner has improperly derived the claimed enlargement factor (**f**), and one of ordinary skill in the art would not derive the claimed enlargement factor (**f**) as done so by the Examiner.

As recited by the Examiner on page 14, second paragraph of the Answer, Wohlwend states in general that “the shrinkage of the form ... is dependent upon the material or the treatment” (with reference to col. 2, lines 17-18 thereof). Furthermore, in the detailed description, it is stated that the modeled data is “enlarged appropriately for the material being used” (note that the term “treatment” is not mentioned in this sentence). The relevant question is now: What is exactly meant by the terms “material” and “treatment” in the whole context of the Wohlwend disclosure?

The only additional information about enlargement factors in the Wohlwend disclosure is contained in the table at column 5. Thereby, the enlargement factors for two specific material

compositions (zircon oxide and aluminum oxide) and different presintering temperatures (pretreatment) are listed. Overall, Wohlwend teaches one of ordinary skill in the art that the specific enlargement factor is dependent upon (i) the type of material (chemical composition) and (ii) the maximum presintering temperature of the material. Consequently, the term “material” as recited in cited col. 2, lines 17–18 stands for the chemical composition of the form, and the term “treatment” means the presintering of the form.

In this context, it is worth pointing out the fact that the enlargement factor is used in order to compensate for the overall shrinkage of a blank during the sintering process. Starting with a green blank, this process may either be performed in one single step or split up in two steps, namely, a presinter step and a main sinter step. In the latter case, a green blank will obviously undergo a first partial shrinkage during the presinter step and a second partial shrinkage during the main sinter step. This is what Wohlwend tries to compensate for when listing enlargement factors for different presinter temperatures, and one of ordinary skill in the art would understand this. And thus according to the teaching of Wohlwend, one of ordinary skill in the art would therefore always use one and the same enlargement factor for a given material composition and presinter temperature.

However, by simply taking into account the maximum temperature during presintering, the Wohlwend approach completely fails to account for the individual properties of each individual blank. This is because enlargement factors used to compensate for the shrinkage will not solely depend on the material and the maximum presinter temperatures, as recognized by the present inventors (and thus achieving the present invention). Specifically, enlargement factors will depend, e.g., on unavoidable fluctuation in process parameters during the production process

of the blank or on the temperature profiles (function of temperature vs. time) during the presintering (see, e.g., the specification at paragraphs [0032] and [0033]). Ceramic sintering is a highly complex process involving numerous chemical and physical sub-processes taking place in parallel.

In this regard, and contrary to the Examiner's interpretation, and as asserted by Appellants during the course of prosecution of this application, Wohlwend teaches the use of a "one size fits all" enlargement factor for a given material and a given presintering temperature. Moreover, Wohlwend is completely silent about how to calculate enlargement factors or any qualifying theoretical method. One of ordinary skill in the art has therefore to assume that enlargement factors are determined in an empirical manner.

Since Wohlwend does not even recognize the problem of "one size fits all" enlargement factors, it cannot be obvious to the skilled artisan to modify any enlargement factor. It is also not obvious to the skilled artisan as to why even bother improving upon such enlargement factors in order to improve methods for the production of tooth substitutes. In contrast, as clear from reading the Wohlwend disclosure, Wohlwend offers a completely different solution for controlling the sinter process, namely the use of a working pack or working stump (see col. 2, lines 9-22). However, this has nothing to do with the claimed invention.

And again, as admitted in the Final Office Action (of May 18, 2009), the cited primary reference of Wohlwend fails to disclose the instantly claimed enlargement factor (**f**) that may be calculated on the basis of a measurable parameter of the blank, as well as failing to disclose the relation between relative densities of the blank and the enlargement factor. Wohlwend also fails to disclose a linear relationship between the enlargement factor and the shrinkage of the blank

upon sintering. These are major deficiencies of the primary reference, which are not properly accounted for in the cited secondary reference(s).

Even when considering the Halloran letter as the secondary reference and combining it with the Wohlwend disclosure, it would not be obvious to arrive at the inventive solution since Halloran fails to explain how the claimed enlargement factor (the cube root of relative and sintered densities) can be calculated in specific detail. As explained in the recent Appeal Brief at pages 18-19, no scientific model or mathematical relation is provided in the Halloran letter, this secondary “reference” fails to recognize the mentioned preconditions, and there is even no disclosure of a cube root, nor a cube root of ρ_s/ρ_R in this reference.

In this regard, combining known prior art elements is not sufficient to render the claimed invention obvious if the results would not have been predictable to one of ordinary skill in the art. *United States v. Adams*, 383 U.S. 39, 51-52, 148 USPQ 479, 483-84 (1966). There is no such predictability here.

Response to Argument #2)

Appellants note pages 16-19 of the Answer. Here, the Examiner is of the opinion that the arguments relating to the required preconditions would be incongruent. Appellants respectfully disagree and request the Board to consider the following.

For Argument 2), the Examiner responds to the Appellants' response of January 12, 2009 at pages 13-14, as well as to the recent Appeal Brief at page 16, second full paragraph and the paragraph bridging pages 16 and 17. In the January 12th response, Appellants previously stated:

The derivation of the claimed formula presented by the Examiner (Page 4, last paragraph - Page 5, first paragraph) is only valid when assuming two very important preconditions: Firstly, exact mass conservation during sintering has to be assumed. Secondly, a blank with homogeneous density distribution has to be provided. Only under these two preconditions, the enlargement factor is independent of the position in the blank and isotropic in all directions. In other words, only if said preconditions are fulfilled, an isotropic and position independent shrinkage of the blank will occur during sintering. It is important to note that these relationships have only been disclosed in the present patent application. In general, one has to assume a non-isotropic enlargement factor which is additionally dependent on the position in the blank with ceramic materials. This fact is reflected in that the prior art only mentions empirical enlargement factors which represent averaged values and thus are much less precise. The derivation of the claimed formula presented by the Examiner is therefore only possible when being aware of the invention.

Applicants note the sentences above (with emphasis added):

... It is important to note that these relationships have only been disclosed in the present patent application. In general, one has to assume a non-isotropic enlargement factor which is additionally dependent on the position in the blank with ceramic materials. This fact is reflected in that the prior art only mentions empirical enlargement factors which represent averaged values and thus are much less precise. The derivation of the claimed formula presented by the Examiner is therefore only possible when being aware of the invention.

Put differently, the Examiner has misconstrued the arguments in the Appeal Brief. Appellants are not of the opinion that the conservation of mass and use of a materially homogeneous blank are inherent features of the Wohlwend disclosure. In contrary, the relevance of these features, which are essential preconditions for the application of the claimed formula for the enlargement factor, is only disclosed and recognized in the present specification of this patent

application. Furthermore, neither the Halloran letter nor any of the cited references discloses any information related to mass conservation or the role of homogeneity in sintering processes.

In this regard, the application of hindsight is inappropriate where the prior art does not suggest that the claimed compound/composition could reasonably be expected to manifest the properties and advantages that were found for the claimed invention. *Sanofi-Synthelabo*, 89 USPQ2d 1370, 1379 (Fed. Cir. 2008). As Wohlend and Halloran is used in all rejections, improper hindsight has been used to form all three rejections.

Response to Argument #3)

Appellants note pages 19-20 of the Answer.

Appellants respond by noting that even if one of ordinary skill in the art would link shrinkage to density, and solely for argument's sake, Wohlwend does not provide any information that the enlargement factor could be calculated by taking into account different densities of the blank. Wohlwend does provide some examples of enlargement factors, but is otherwise completely silent about how to derive these factors. These are major deficiencies of the primary reference. In finding a reasonable expectation of success, at least some degree of predictability is required. *In re Rinehart*, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976). That such predictability is missing here, especially given the actual disclosure of Wohlwend.

Also in this context, the secondary "reference" of Halloran, after the skilled artisan has read the present application, merely states that it could be possible to calculate the enlargement factor out of densities. However, Halloran is completely silent on how to do this. The Examiner has not accounted for such a deficient disclosure (or at least done so properly) by citing Halloran

or any of the other references. More specifically, Halloran does not teach how to calculate the ratio of the relative density and the sinter density, nor does this "reference" use the cube root of said ratio in order to determine the enlargement factor.

Thus, the Examiner has not sufficiently rebutted Appellants' position.

Response to Arguments #4) and #5)

Appellants note pages 20-23 of the Answer. Here, the Examiner alleges that Appellants say that Halloran would constitute conventional practice at the time of the invention. Appellants respectfully and heavily traverse these comments by the Examiner.

Appellants have not stated that Halloran would constitute prior art. This is clearly in contrast to the prosecution history record and even the recent Appeal Brief (see, e.g., page 18 of the Appeal Brief). Again, the Halloran letter was created after reading the present specification, i.e., after the filing of the present application. The Halloran letter only proves that, after reading the present application, it is possible to carry out the invention as claimed, and nothing more. Again, the Examiner is misconstruing the Halloran letter.

Additional Arguments For the Presently Claimed Invention

In connection with the Examiner's derivation of the claimed formula (see page 5, last paragraph of the Answer), Appellants respectfully request the honorable Board to consider the following, and what one of ordinary skill in the art would take into account. The comments relate to the Examiner's interpretation of the claimed enlargement factor (Answer, page 5, last paragraph).

1. Applicant's enlargement factor is not based on "mathematics" (as asserted in the Answer at page 5, last paragraph) but on a complex technical relationship with two measurable parameters (ρ_S and ρ_R) of a ceramic body. Surprisingly, this relationship is represented by the claimed formula. However, this relationship is only disclosed and recognized in the present patent application. None of the cited references nor the Halloran letter discloses any comparable information. Even the Halloran letter is silent about the detailed calculation of an enlargement factor. Appellants respectfully submit that improper hindsight reconstruction has been applied by the Examiner to form the instant rejections. It is normally easy to search in the literature for pieces of information and to put them together in a manner not suggested and to overlook under which circumstances the pieces of information were disclosed. It is not sufficient to be able to show that certain pieces of information *could* have been combined by a person skilled in the art. Even circumstances that speak against a combination have to be considered. The question is if a person skilled in the art and with no knowledge of the actual invention would have found it obvious, guided by the disclosure in the references (if the references are properly referred to in the first place), to combine them in such a manner that all the necessary characteristics of the invention were revealed. If the references do not disclose all the necessary characteristics then no proper combination can be made. Here, the references do not even disclose the claimed formula of
$$f = \sqrt[3]{\frac{\rho_S}{\rho_R}}$$
. All three rejections should be reversed, and the Examiner's derivation of the claimed enlargement factor is improper.

2. Ceramic sintering is a highly complex process involving numerous chemical and physical sub-processes taking place in parallel. Why should one of ordinary skill in the art assume conservation of mass in such a complex process *a priori*? The Examiner has not provided sufficient evidence, and assuming conservation of mass is therefore not obvious.
3. A vector quantity is defined as a quantity that possesses both magnitude and direction. Appellants wonder how the cube root of the density ratio (ρ_S/ρ_R), a single dimensionless number, can reduce the density ratio (ρ_S/ρ_R) into a “linear vector quantity” as stated by the Examiner (Answer, page 5, last paragraph). Additionally, the term “linear vector quantity” has no meaning to the skilled artisan. Linearity, for instance, denotes a functional relationship between certain parameters. However, a vector quantity does not define a functional relationship. Overall, Appellants request the Board to review the Examiner's arguments for coherency.
4. Appellants wonder how one can define a “natural” form for scaling a digital representation of a volumetric body in this context (Answer, page 5, last paragraph)? The enlargement factor, which accounts for various chemical and physical processes taking place during sintering, may in principle depend in very different ways from numerous properties of the blank. Consequently, there is no form of scaling or no enlargement factor that would be “natural” *a priori*. The Examiner's derivation of the claimed enlargement factor is improper.

5. Furthermore, if the claimed formula would be so notoriously well known as asserted by the Examiner, why is the Examiner not able to provide any additional written proof or at least some further written evidence in favor of his arguments? All of the Examiner's unfunded arguments related to the claimed formula are solely based on improper hindsight assumptions and reconstructions. Reversal of all three rejections is respectfully requested.

IV. CONCLUSION

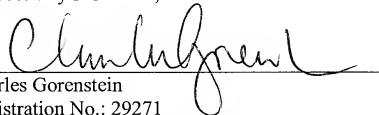
For all of the reasons set forth above and those set forth in the Appeal Brief, each of the rejections in the Final Office Action as well as the contentions in the Examiner's Answer are improper. It is therefore respectfully requested that the honorable Board reverse the Examiner on all grounds.

In Response to Examiner's Answer of 04/13/2010

If necessary, the Director is hereby authorized in this, concurrent, and future replies to charge any fees required during the pendency of the above-identified application or credit any overpayment to Deposit Account No. 02-2448.

Dated: June 14, 2010

Respectfully submitted,

By 

Charles Gorenstein

Registration No.: 29271

BIRCH, STEWART, KOLASCH & BIRCH, LLP

8110 Gatehouse Road, Suite 100 East

P.O. Box 747

Falls Church, VA 22040-0747

703-205-8000